WHAT IS CLAIMED IS:

1. An electro-optical glazing structure having total-reflection and transparent modes of operation for selectively reflecting and transmitting electromagnetic radiation without absorption, respectively, said electro-optical glazing comprising:

an electro-optical panel of laminated construction, having first and second optical states of operation; and

optical state switching means for switching said electro-optical panel to said first optical state of operation in order to induce said electro-optical glazing into said total-reflection mode of operation, and for switching said electro-optical panel to said second optical state of operation in order to induce said electro-optical glazing into said transmission mode of operation,

wherein electromagnetic radiation within a first prespecified bandwidth falling incident upon said electro-optical panel is totally reflected from said electro-optical panel without absorption when said electro-optical panel is switched to said first optical state of operation, and

wherein electromagnetic radiation within a second prespecified bandwidth falling incident upon said electro-optical panel is transmitted through said electro-optical panel without absorption when said electro-optical panel is switched to said second optical state of operation.

2. The electro-optical glazing structure of claim 1, wherein said first prespecified bandwidth comprises the infrared (IR) portion and ultra-violet (UV) portions of the electromagnetic spectrum, and said second

prespecified bandwidth comprises said IR portion, said UV portion and the visible portion of the electromagnetic spectrum.

3. The electro-optical glazing structure of claim 1, wherein said electro-optical panel comprises:

a first electrically-passive cholesteric liquid crystal (CLC) electromagnetic radiation polarizing panel;

a second electrically-passive CLC electromagnetic radiation polarizing panel; and an electrically-active π-phase retardation panel interposed between said first and second electrically-passive CLC electromagnetic radiation polarizing panels.

4. The electro-optical glazing structure of claim 3,

wherein said first and second electrically-passive CLC electromagnetic radiation polarizing panels totally reflect without absorption electromagnetic radiation having a left hand circularly polarized (LHCP) state and a wavelength within said first prespecified bandwidth when said electro-optical panel is switched to said first optical state of operation,

wherein said first and second electrically-passive CLC electromagnetic radiation polarizing panels transmit without absorption electromagnetic radiation having either a right hand circularly polarized (RHCP) state and/or a wavelength outside said first prespecified bandwidth when said electro-optical panel is switched to said first optical state of operation; and

wherein said first and second electrically-passive CLC electromagnetic radiation polarizing panels transmit without absorption

electromagnetic radiation having either said LHCP state or said RHCP state and a wavelength within said second prespecified bandwidth when said electro-optical panel is switched to said second optical state of operation.

5. The electro-optical glazing structure of claim 3,

wherein said first and second electrically-passive CLC electromagnetic radiation polarizing panels totally reflect without absorption electromagnetic radiation having a right hand circularly polarized (RHCP) state and a wavelength within said first prespecified bandwidth when said electro-optical panel is switched to said first optical state of operation,

wherein said first and second electrically-passive CLC electromagnetic radiation polarizing panels transmit without absorption electromagnetic radiation having either a left hand circularly polarized (LHCP) state and/or a wavelength outside said first prespecified bandwidth when said electro-optical panel is switched to said first optical state of operation; and

wherein said first and second electrically-passive CLC electromagnetic radiation polarizing panels transmit without absorption electromagnetic radiation having either said LHCP state or said RHCP state and a wavelength within said second prespecified bandwidth when said electro-optical panel is switched to said second optical state of operation.

6. The electro-optical glazing structure of claim 1, wherein said electro-optical panel comprises:

a first electrically-active cholesteric liquid crystal (CLC) electromagnetic radiation polarizing panel;

a second electrically-active CLC electromagnetic radiation polarizing panel; and an electrically-passive π-phase retardation panel interposed between said first and second electrically-active CLC electromagnetic radiation polarizing panels.

7. The electro-optical glazing structure of claim 6,

wherein said first and second electrically-active CLC electromagnetic radiation polarizing panels totally reflect without absorption electromagnetic radiation having a left hand circularly polarized (LHCP) state and a wavelength within said first prespecified bandwidth when said electro-optical panel is switched to said first optical state of operation,

wherein said first and second electrically-active CLC electromagnetic radiation polarizing panels transmit without absorption electromagnetic radiation having either a right hand circularly polarized (RHCP) state and/or a wavelength outside said first prespecified bandwidth when said electro-optical panel is switched to said first optical state of operation; and

wherein said first and second electrically-active CLC electromagnetic radiation polarizing panels transmit without absorption electromagnetic radiation having either said LHCP state or said RHCP state and a wavelength within said second prespecified bandwidth when said electro-optical panel is switched to said second optical state of operation.

8. The electro-optical glazing structure of claim 6,

wherein said first and second electrically-active CLC electromagnetic radiation polarizing panels totally reflect without absorption electromagnetic radiation having a right hand circularly polarized (RHCP) state and a wavelength within said first prespecified bandwidth when said

electro-optical panel is switched to said first optical state of operation,

wherein said first and second electrically-active CLC electromagnetic radiation polarizing panels transmit without absorption electromagnetic radiation having either a left hand circularly polarized (LHCP) state and/or a wavelength outside said first prespecified bandwidth when said electro-optical panel is switched to said first optical state of operation; and

wherein said first and second electrically-active CLC electromagnetic radiation polarizing panels transmit without absorption electromagnetic radiation having either said LHCP state or said RHCP state and a wavelength within said second prespecified bandwidth when said electro-optical panel is switched to said second optical state of operation.

9. The electro-optical glazing structure of claim 1, wherein said electro-optical panel comprises:

a first electrically-active cholesteric liquid crystal (CLC) electromagnetic radiation polarizing panel; and

a second electrically-active CLC electromagnetic radiation polarizing panel adjacent said first electrically-active CLC electromagnetic radiation polarizing panel.

10. The electro-optical glazing structure of claim 9,

wherein said first electrically-active CLC electromagnetic radiation polarizing panel totally reflects without absorption electromagnetic radiation having a left hand circularly polarized (LHCP) state and a wavelength within said first prespecified bandwidth when said electro-optical panel is switched to said first optical state of operation, and

wherein said first electrically-active CLC electromagnetic radiation

polarizing panels transmits without absorption electromagnetic radiation having either a right hand circularly polarized (RHCP) state and/or a wavelength outside said first prespecified bandwidth when said electro-optical panel is switched to said first optical state of operation;

wherein said second electrically-active CLC electromagnetic radiation polarizing panel totally reflects without absorption electromagnetic radiation having said RHCP state and a wavelength within said first prespecified bandwidth when said electro-optical panel is switched to said first optical state of operation, and

wherein said second electrically-active CLC electromagnetic radiation polarizing panels transmits without absorption electromagnetic radiation having either said LHCP state and/or a wavelength outside said first prespecified bandwidth when said electro-optical panel is switched to said first optical state of operation; and

wherein said first and second electrically-active CLC electromagnetic radiation polarizing panels transmit without absorption electromagnetic radiation having either said LHCP state or said RHCP state and a wavelength within said second prespecified bandwidth when said electro-optical panel is switched to said second optical state of operation.

11. The electro-optical glazing structure of claim 1, which further comprises:

a window frame for mounting said electro-optical panel within a house or office building, or aboard a transportation vehicle;

12. The electro-optical glazing structure of claim 11, which further comprises:

a electromagnetic-sensor mounted on said window frame, for sensing electromagnetic conditions;

a battery supply mounted within said window frame, for providing electrical power;

a electromagnetic-powered battery recharger mounted within said window frame, for recharging the battery;

electrical circuitry mounted within said window frame, for producing glazing control voltages for switching said first and second optical states of operation; and

a programmable micro-computer chip mounted within said window frame, for controlling the operation of said battery recharger and said electrical circuitry, and the production of said glazing control voltages as required by a radiation flow control program stored within said programmable microcontroller.

13. An intelligent pair of sunglasses, comprising:

a frame; and

a pair of optical element supported within said frame,

wherein each said optical element is realized using said electro-optical glazing structure of claim 1.

14. An intelligent window system for dynamic electromagnetic radiation control which comprises:

a plurality of said electro-optical glazing structures of claim 11, each mounted within a house or office building, or aboard a transportation vehicle; and

a central control computer for coordinating the operation of said

electro-optical glazing structures.

15. An composite electro-optical glazing structure which comprises:

a plurality of said electro-optical glazing structures of claim 1, stacked together as a composite electro-optical structure,

wherein said composite electro-optical structure has more than two said optical states of operation which permit complex levels of electromagnetic radiation control.

16. A stereoscopic 3-D viewing device in the form of eyeglasses, comprising:

a pair of optical elements positionable before the eyes of a user of said eyeglasses,

each said optical element including said electro-optical glazing structure of claim 1,

whereby said eyeglasses can control electromagnetic radiation during stereoscopic 3-D viewing or monoscopic 2-D viewing of displayed images (i.e. virtual world viewing), or during stereoscopic viewing of real world objects.

17. An electro-optical glazing structure which has total-reflection, semi-transparent and totally transparent modes of operation for improved control over the flow of electromagnetic radiation within the solar region of the electromagnetic spectrum (i.e. Solar Spectrum).

18. An electro-optical glazing structure, in which the modes of operation can be electrically-activated or switched, while avoiding the use of energy

absorbing mechanisms.

19. An electro-optical glazing structure having a broad band of operation, including the IR, visible and UV portions of the electromagnetic spectrum.

20. An electrically-active -phase retardation panel interposed between a pair of electrically-passive electromagnetic radiation polarizing panels, both of which are capable of reflecting electromagnetic radiation of a certain polarization state, whereby a totally reflective state of operation and a semi-transparent state of operation are provided over the electromagnetic region of the electromagnetic spectrum.

21. An electro-optical glazing structure, comprising an electrically-active -phase retardation panel interposed between a pair of electrically-passive electromagnetic radiation polarizing panels, both of which are capable of reflecting electromagnetic radiation of a linear polarization state, whereby a totally reflective state of operation and a semi-transparent state of operation are provided over the electromagnetic region of the electromagnetic spectrum.

22. An electro-optical glazing structure, comprising an electrically-active π-phase retardation panel interposed between a pair of electrically-passive electromagnetic radiation polarizing panels, both of which are capable of reflecting electromagnetic radiation of a linear polarization state, one is parallel to other, whereby a totally reflective state of operation and a semi-transparent state of operation are provided over the electromagnetic region of the electromagnetic spectrum.

23. An electro-optical glazing structure, comprising an electrically-active π-phase retardation panel interposed between a pair of electrically-passive electromagnetic radiation polarizing panels, both of which are capable of reflecting electromagnetic radiation of a linear polarization state, one is perpendicular to other, whereby a totally reflective state of operation and a semi-transparent state of operation are provided over the electromagnetic region of the electromagnetic spectrum.

24. An electro-optical glazing structure, comprising an electrically-active π-phase retardation panel interposed between a pair of electrically-passive cholesteric liquid crystal (CLC) electromagnetic radiation polarizing panels, both of which are capable of reflecting electromagnetic radiation of a LHCP state, whereby a totally reflective state of operation and a semi-transparent state of operation are provided over the electromagnetic region of the electromagnetic spectrum.

25. An electro-optical glazing structure, comprising an electrically-active π-phase retardation panel interposed between a pair of electrically-passive CLC electromagnetic radiation polarizing panels, both of which are capable of reflecting electromagnetic radiation of a RHCP state, whereby a totally reflective state of operation and a semi-transparent state of operation are provided over a broad-band region of the electromagnetic spectrum.

26. An electro-optical glazing structure, comprising an electrically-active π-phase retardation panel interposed between a pair of electrically-

passive CLC electromagnetic radiation polarizing panels, one of which is capable of reflecting electromagnetic radiation of the LHCP state and the other of which is capable of reflecting electromagnetic radiation of the RHCP state, whereby a totally reflective state of operation and a semi-transparent state of operation are provided over a broad-band region of the electromagnetic spectrum.

27. An electro-optical glazing structure, comprising an electrically-passive π-phase retardation panel interposed between a pair of electrically-active CLC electromagnetic radiation polarizing panels, both of which are capable of reflecting electromagnetic radiation of the LHCP state, whereby a totally reflective state of operation and a totally transparent state of operation are provided over a broad-band region of the electromagnetic spectrum.

28. An electro-optical structure, comprising an electrically-passive π-phase retardation panel interposed between a pair of electrically-active CLC electromagnetic radiation polarizing panels, both of which are capable of reflecting electromagnetic radiation of the RHCP state, whereby a totally reflective state of operation and a semi-transparent state of operation are provided over a broad-band region of the electromagnetic spectrum.

29. An electro-optical glazing structure, comprising a pair of electrically-active CLC electromagnetic radiation polarizing panels, one of which is capable of reflecting electromagnetic radiation of the LHCP state and the other of which is capable of reflecting electromagnetic radiation of the RHCP state, whereby a totally reflective state of operation and a totally transparent state of operation are provided over a broad-band region of

the electromagnetic spectrum.

30. An actively-controlled window or viewing panel constructed from the electro-optical glazing structure of the present invention, wherein the transmission of electromagnetic radiation can be dynamically controlled over a broad-band region of the electromagnetic spectrum, between 50% transmission to 100% reflection and between 100% transmission to 100% reflection.

31. An actively-controlled window or viewing panel constructed from an electro-optical glazing structure, wherein the transmission of electromagnetic radiation over the UV and IR regions of the electromagnetic spectrum can be totally reflected, rather than absorbed, reducing the temperature cycle range which the window structure is required to undergo.

32. An actively-controlled window or viewing panel constructed from an electro-optical glazing structures, wherein only UV and IR radiation is reflected at the window surface, while electromagnetic radiation over the visible band is transmitted to the interior environment being maintained under thermal control.

33. An intelligent window system for installation within a house or office building, or aboard a transportation vehicle such as an airplane or automobile, wherein an electro-optical glazing structure thereof is supported within a prefabricated window frame, within which are mounted: a electromagnetic-sensor for sensing electromagnetic conditions

in the outside environment; a battery supply for providing electrical power; a electromagnetic-powered battery recharger for recharging the battery; electrical circuitry for producing glazing control voltages for driving the electrically-active elements of the electro-optical glazing supported within the window frame; and a micro-computer chip for controlling the operation of the battery recharger and electrical circuitry and the production of glazing control voltages as required by a radiation flow control program stored within the programmed microcontroller.

34. An electro-optical window structure which is designed for integration within the heating/cooling system of a house, office building, factory or vehicle in order to control the flow of broad-band electromagnetic radiation through the electro-optical window structure, while minimizing thermal loading upon the heating/cooling system thereof.

35. An intelligent pair of shutter glasses, in which each optical element is realized using an electro-optical glazing structure fashioned to the dimensions of a shutter glass frame.